HMT-West/CalWater 2011: IOP3 Summary

- Operations director: Dave Kingsmill
- Duration
  - Start: 00 UTC 14 February 2011
  - End: 00 UTC 17 February 2011
- Activities at Lincoln (LHM) field site
  - Skywater Doppler radar operated from ~15 UTC 14 Feb to ~00 UTC 17 Feb. Brief gap in data collection between 0710 UTC and 0730 UTC on 16 Feb.
  - A total of 15 GPS balloon soundings were released at the following times:
    - 14 Feb (00, 06, 12, 18 UTC), 15 Feb (00, 06, 12, 16, 20 UTC), 16 Feb (00, 04, 08, 12, 16, 20 UTC).
- NWS rawinsonde activities
  - Oakland supplemental soundings were released at 18 UTC on 14-16 Feb and 06 UTC on 15-16 Feb (total of 5). Reno supplemental soundings were released at 06 UTC and 18 UTC on both 15 and 16 Feb (total of 4).

HMT-West/CalWater 2011: IOP3 Summary

- Autonomous instrument operation problems
  - Big Bend (BBD): Hot-plate precipitation gauge was not operating between 01 UTC 13 Feb and 15 UTC 15 Feb.
  - Cazadero (CZC): A power-outage disabled the S-band precipitation profiler between 20 UTC 16 Feb and 01 UTC 17 Feb.
  - Blue Canyon (BLU): The heater on the heated tipping bucket precipitation gauge failed. As a result, data collected at temperatures less than 0°C is suspect.
- G-1 aircraft operations
  - Flight 9 (14 Feb), Flight 10 (15 Feb) and Flight 11 (16 Feb)
- Water collection for isotopic analysis
  - Cazadero and Shasta Dam: 0600 UTC 15 Feb to 0600 UTC 17 Feb
  - Lincoln: 1200 UTC 15 Feb to 1200 UTC 17 Feb
  - Sugar Pine: 1853 UTC 14 Feb to 1853 UTC 16 Feb

HMT-West/CalWater 2011: IOP3 Summary

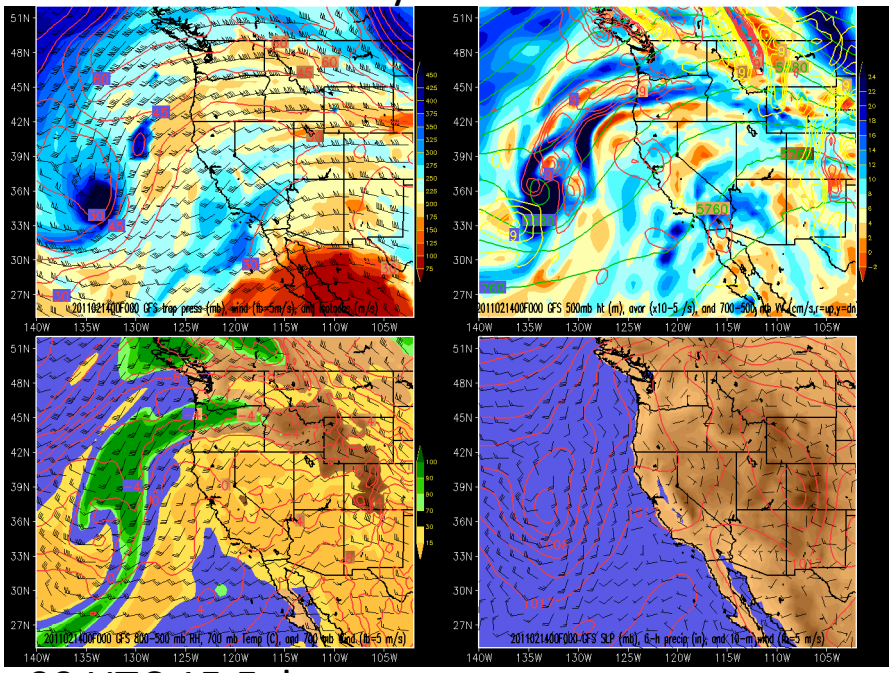
- Overview

This 72 hour IOP occurred after a 6-week period without significant precipitation in the HMT-West/CalWater domain. The event was associated with a marginal atmospheric river (AR) that did not have a tropical or subtropical connection. Two different episodes of widespread precipitation were observed, the first during the day on 14 Feb and the second late in the day on 15 Feb continuing through the morning of 16 Feb. Coastal regions received much more precipitation on the ground during the first episode relative to the Central Valley and Sierra due to evaporative processes in the dry continental boundary layer. In contrast, the Sierra received more precipitation during the second episode relative to the coast. Barrier jets were evident along the Sierra during both episodes of widespread precipitation. There was not an obvious frontal passage associated with the first period of widespread precipitation, but the second period of widespread precipitation was followed by a distinct narrow-cold-frontal rainband (NCFR). Snow levels during the first episode of precipitation were 5.0 to 6.5 kft. Colder air associated with the second episode of precipitation led to snow levels that started at ~5 kft but then descended to ~3kft after NCFR passage. Precipitation accumulations for the IOP were 2” to 5” in the Sierra, 3” to 6” inches along the coastal mountains and 0.5” to 1” in the Central Valley.

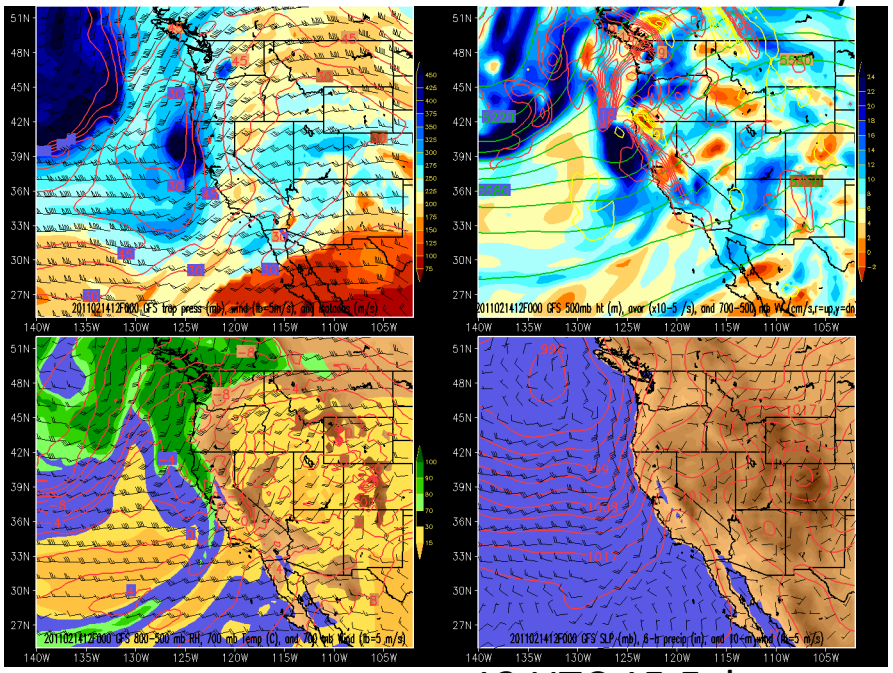
The images in the following slides provide additional context for the IOP

Synoptic Evolution

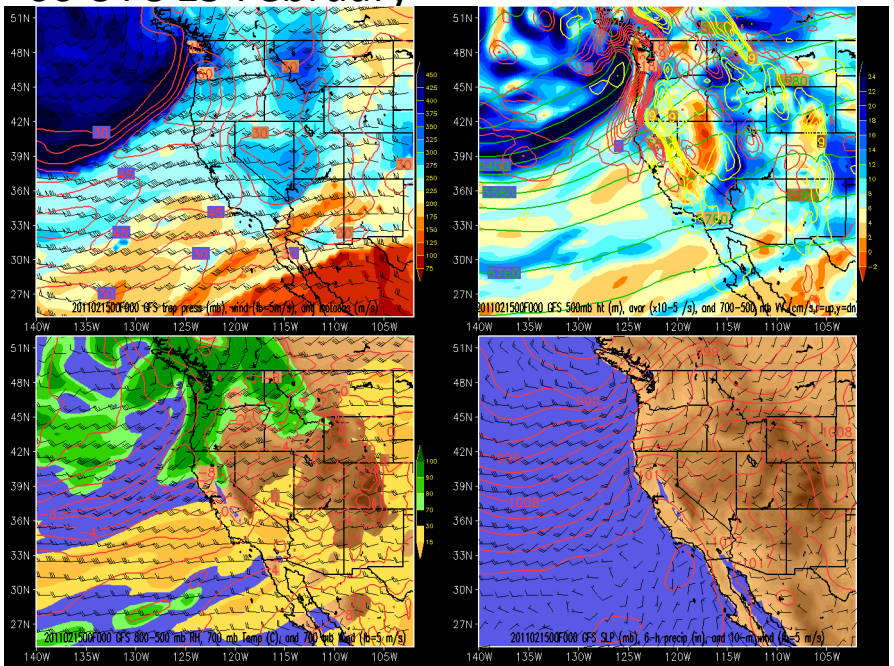
00 UTC 14 February



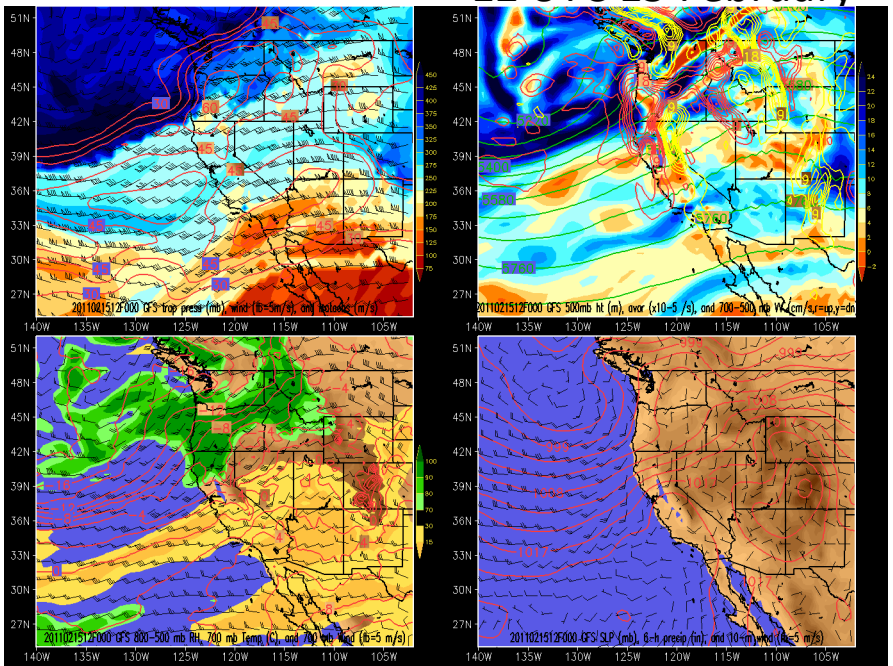
12 UTC 14 February



00 UTC 15 February

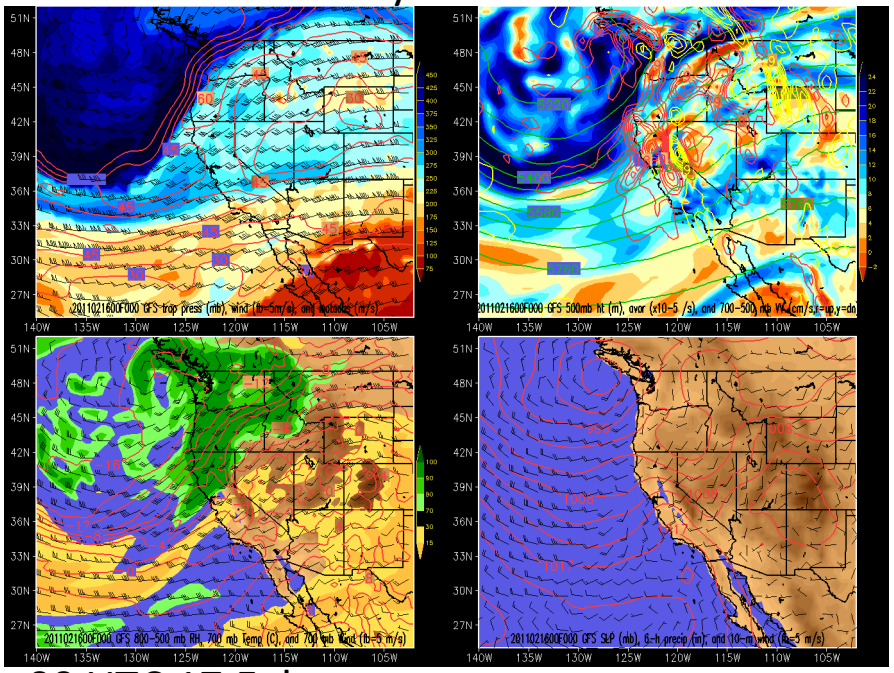


12 UTC 15 February

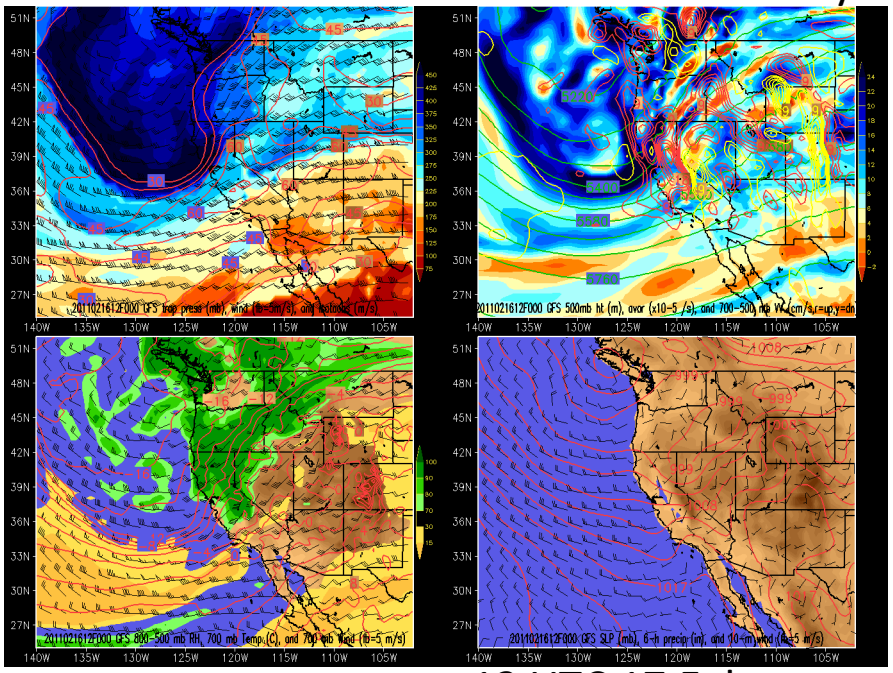


Synoptic Evolution

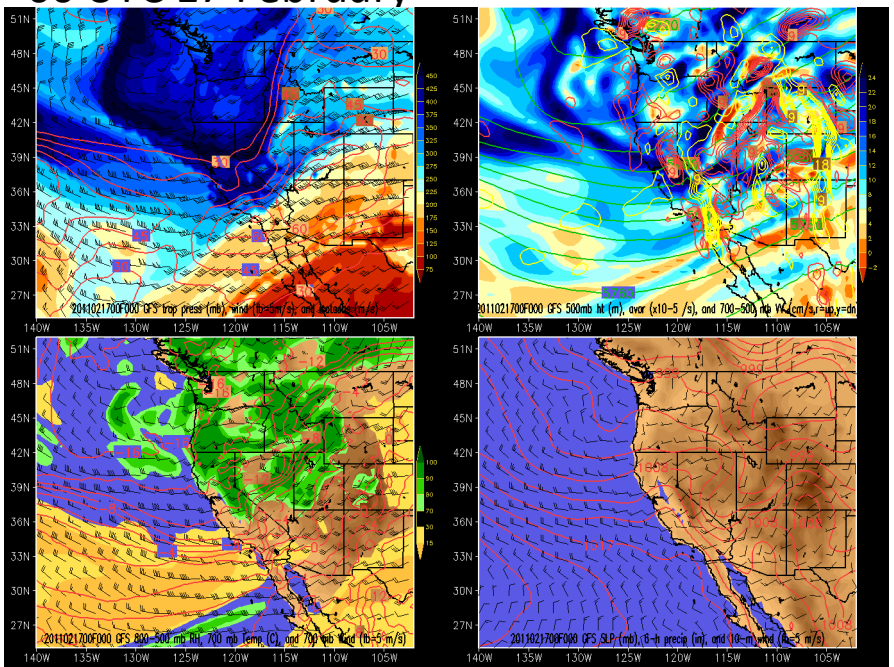
00 UTC 16 February



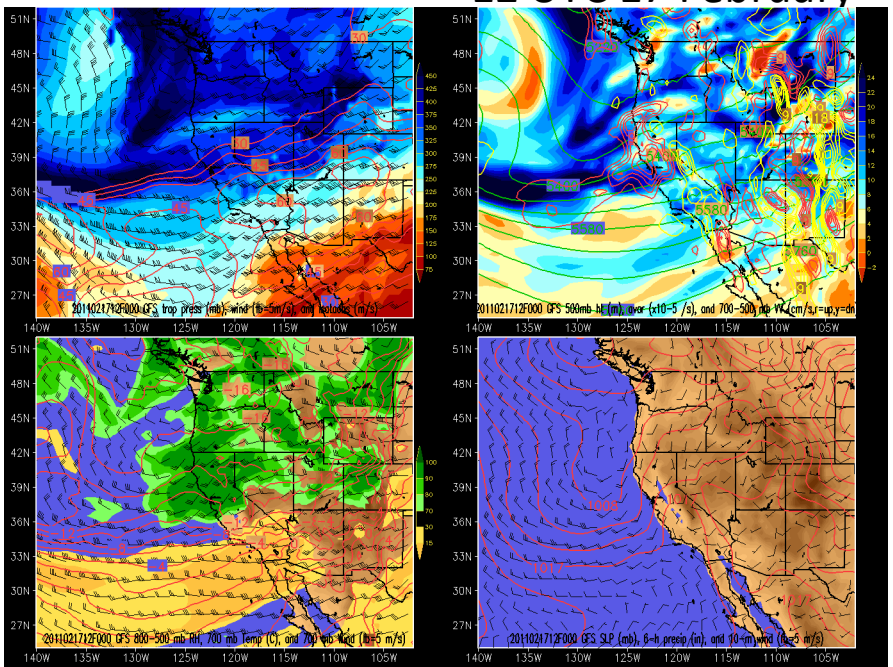
12 UTC 16 February



00 UTC 17 February

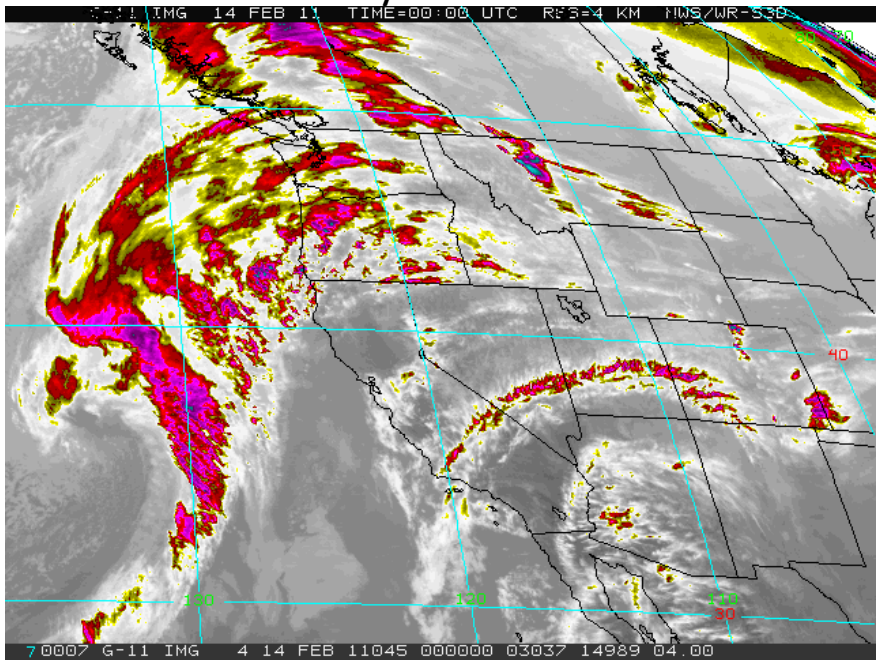


12 UTC 17 February

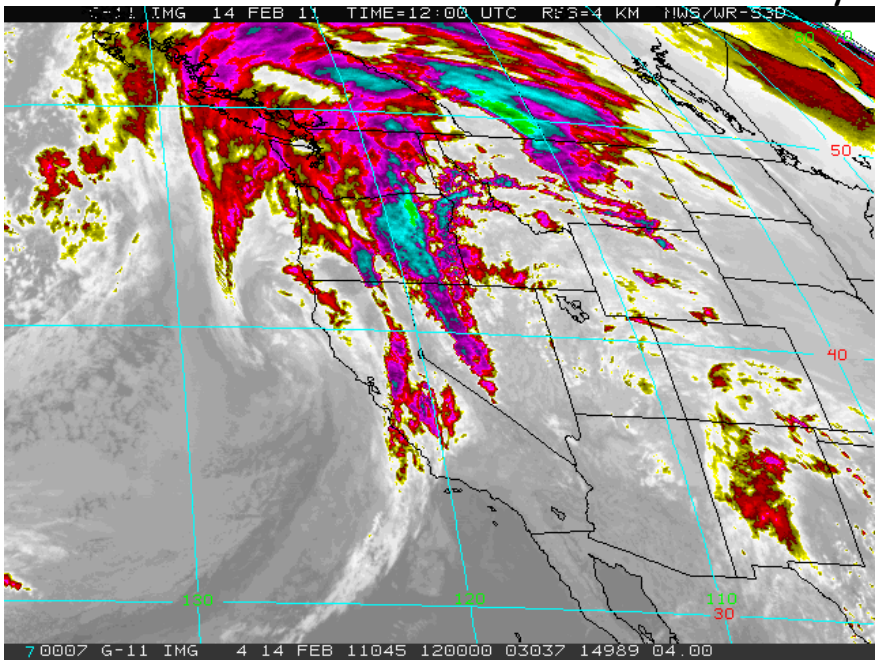


IR Satellite Evolution

00 UTC 14 February



12 UTC 14 February



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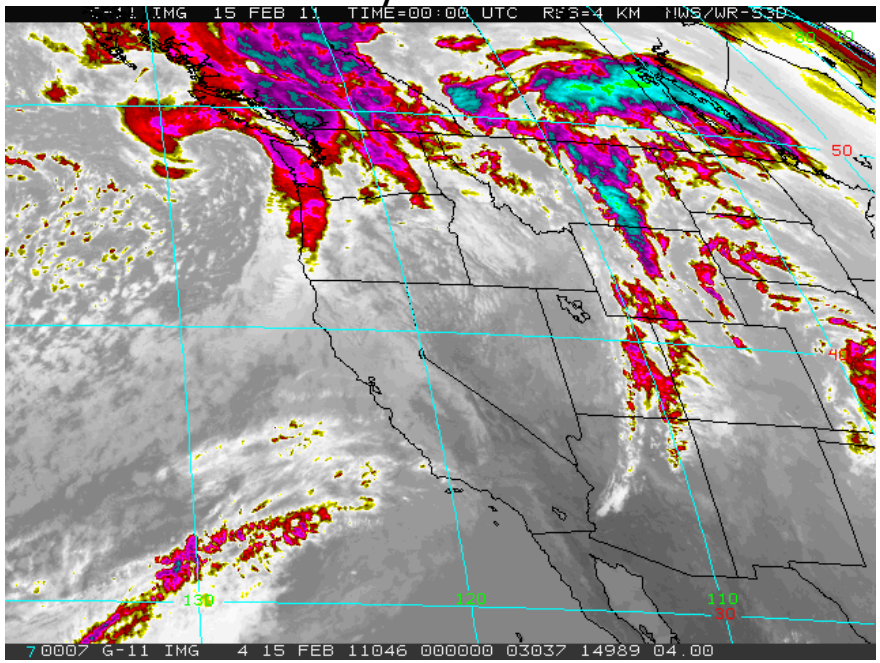

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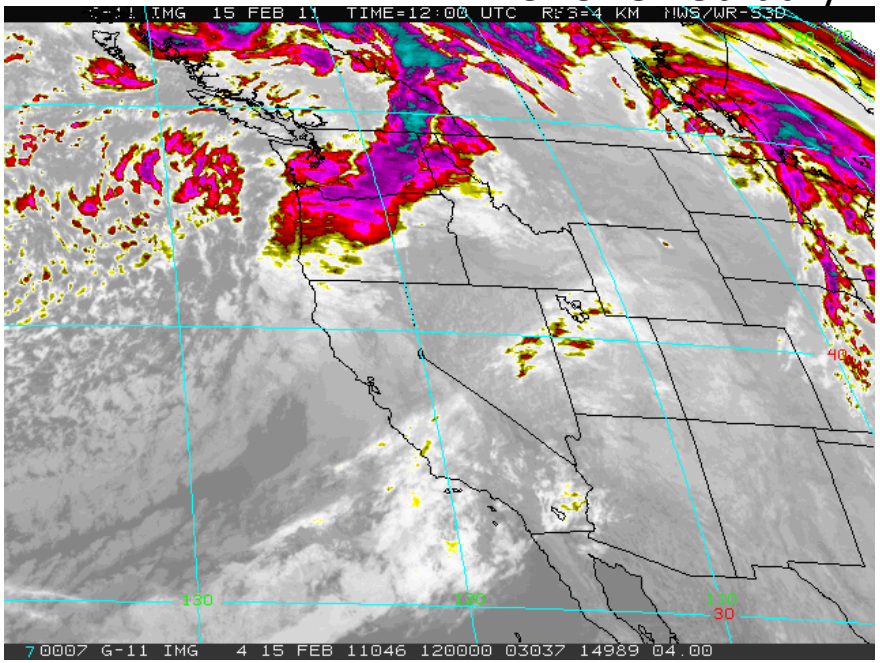
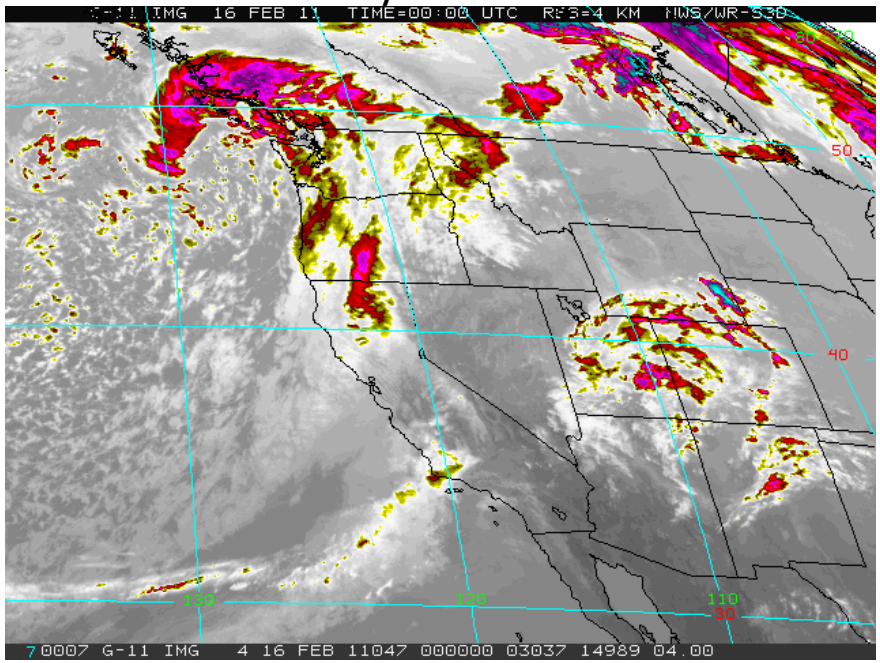
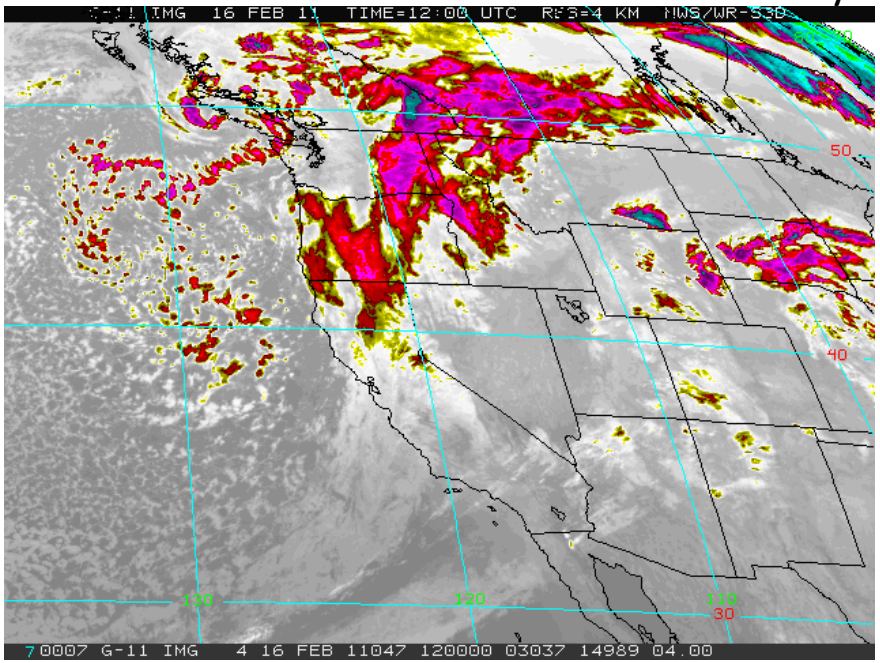


IR Satellite Evolution

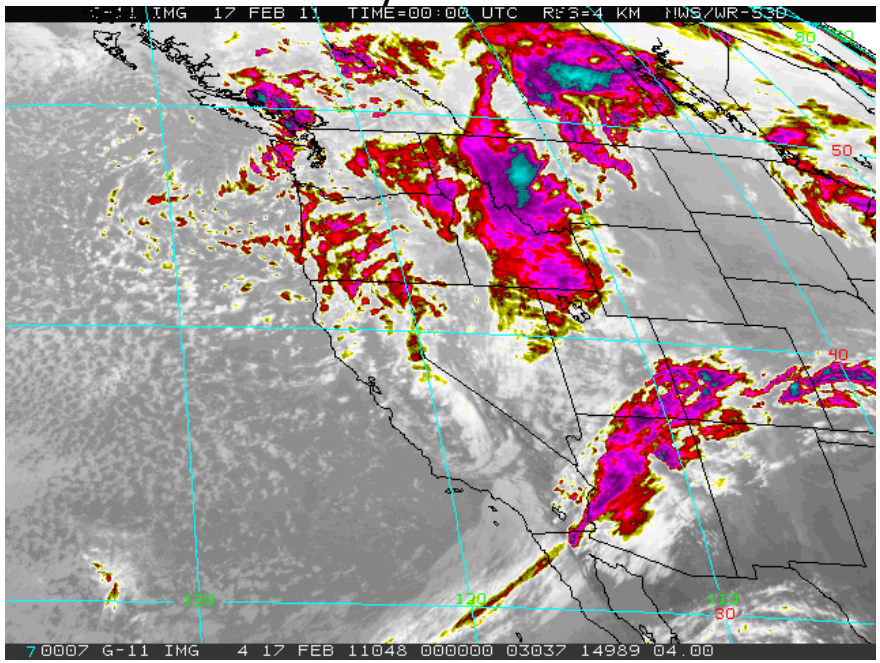
00 UTC 16 February



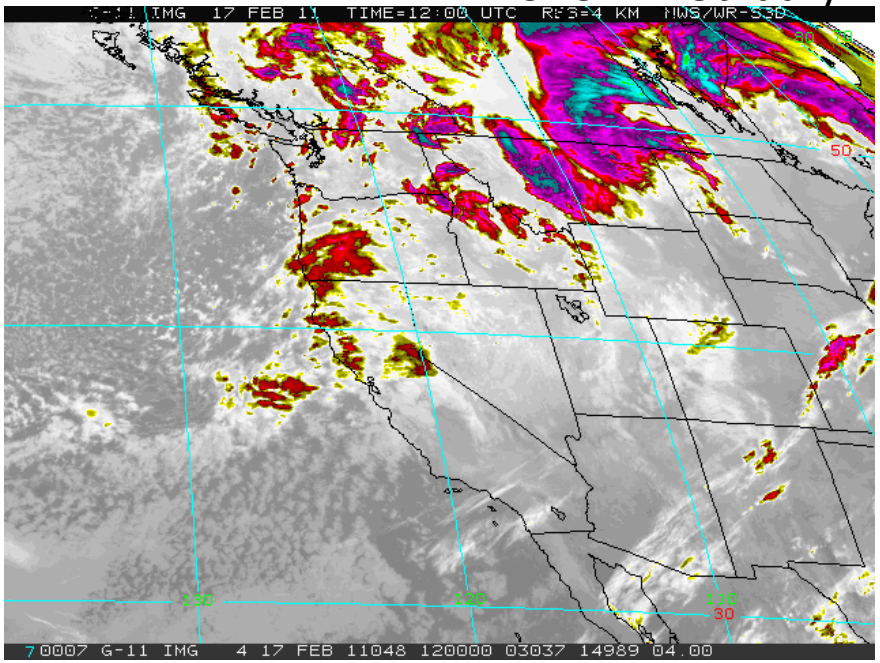
12 UTC 16 February



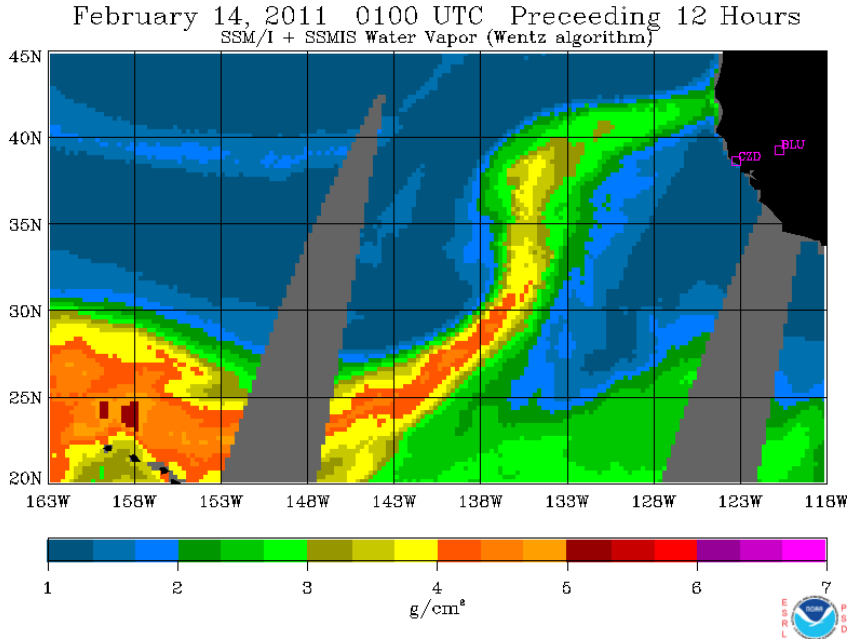
00 UTC 17 February

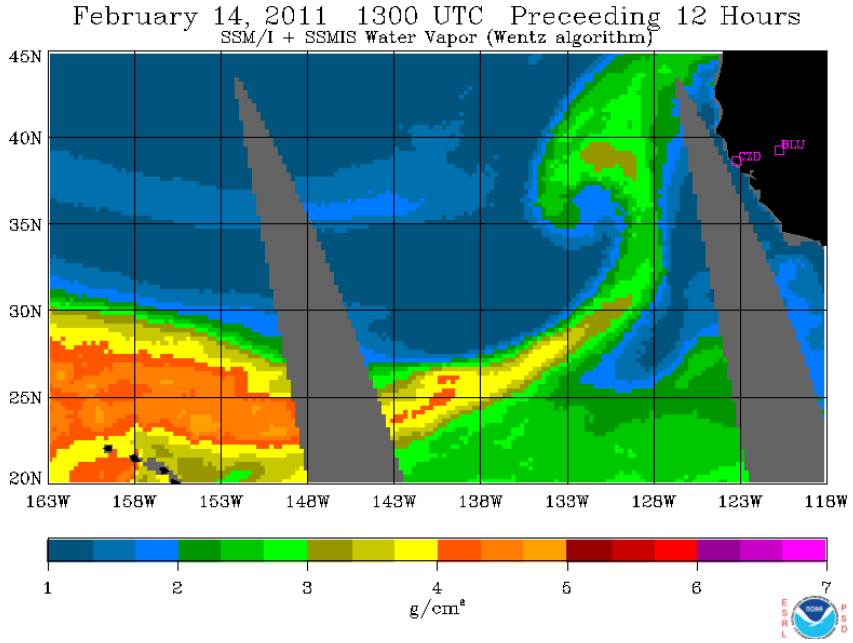


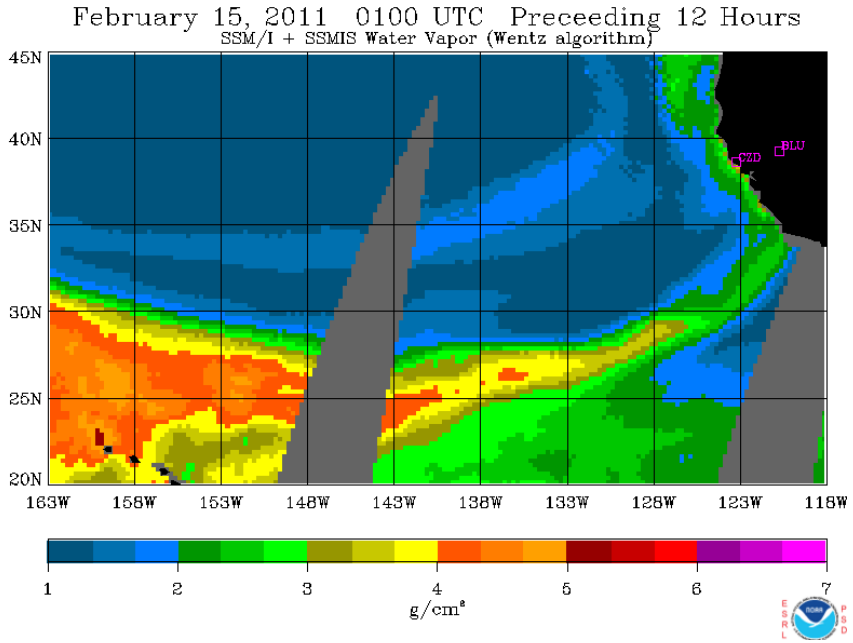
12 UTC 17 February

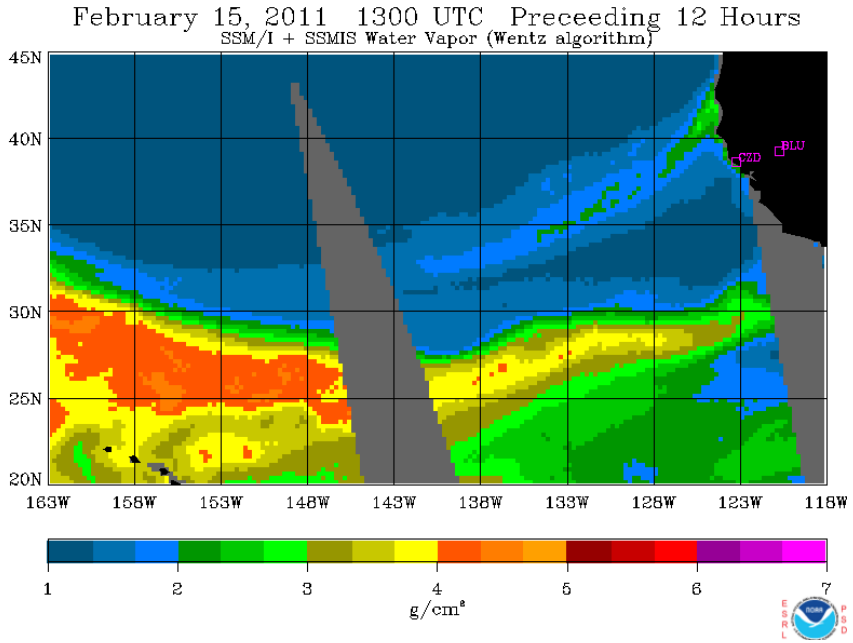


SSM/I Satellite IWV Evolution

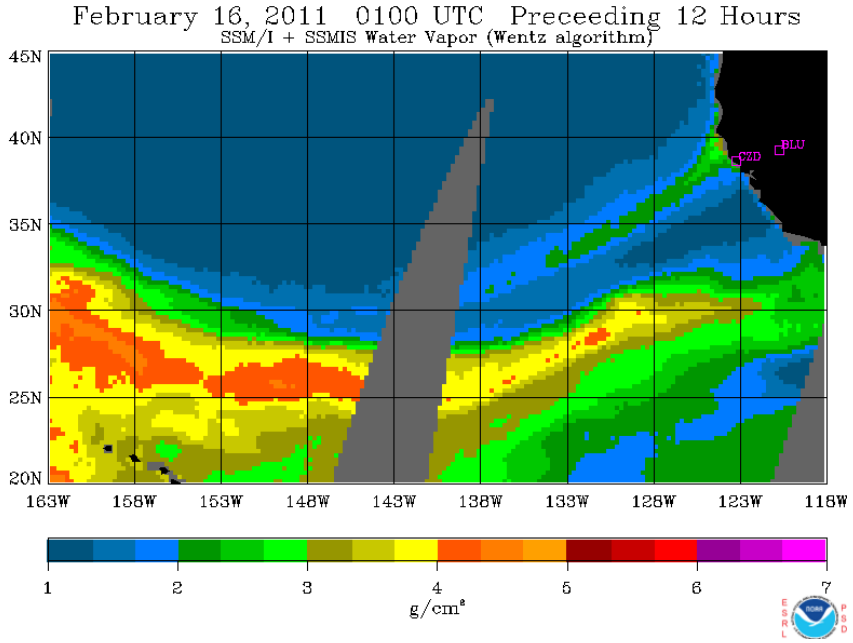


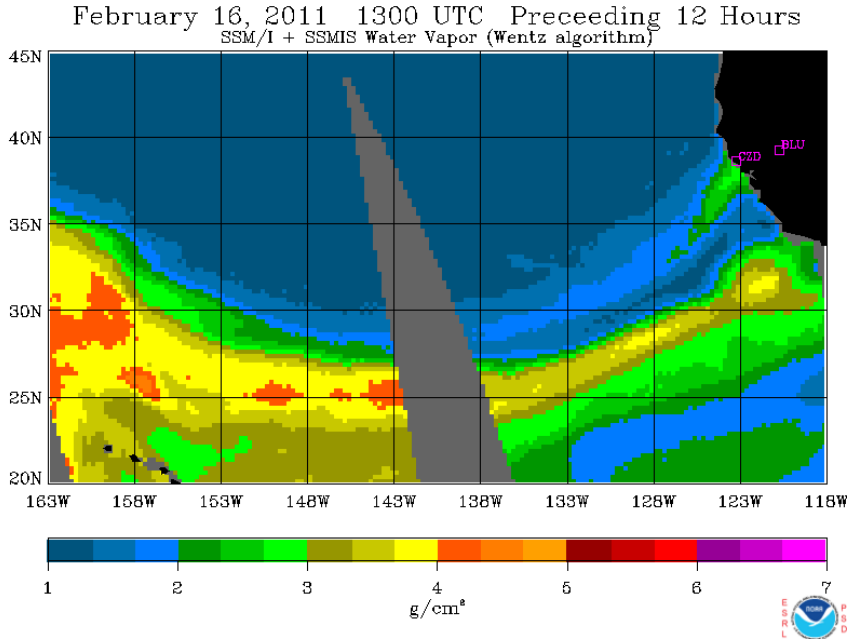


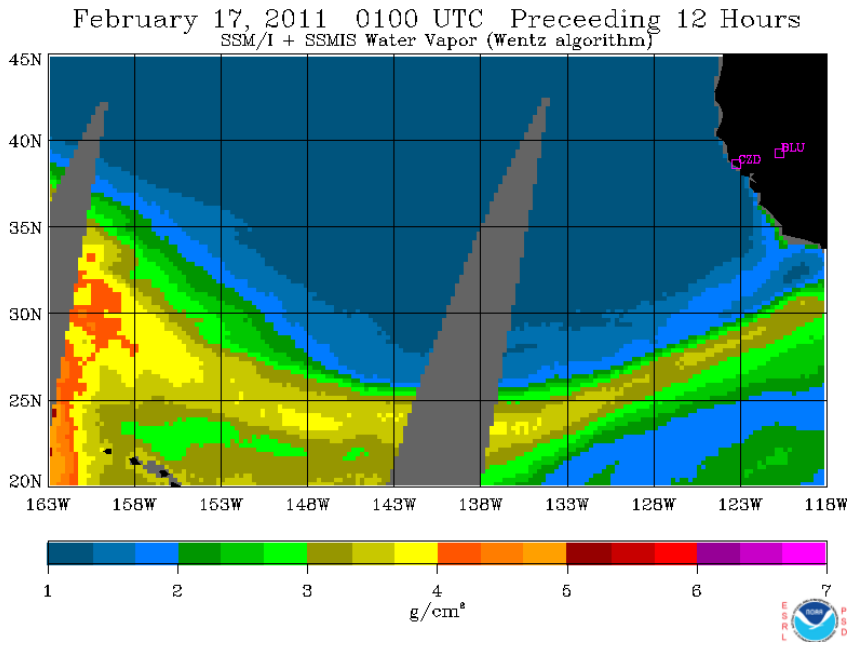


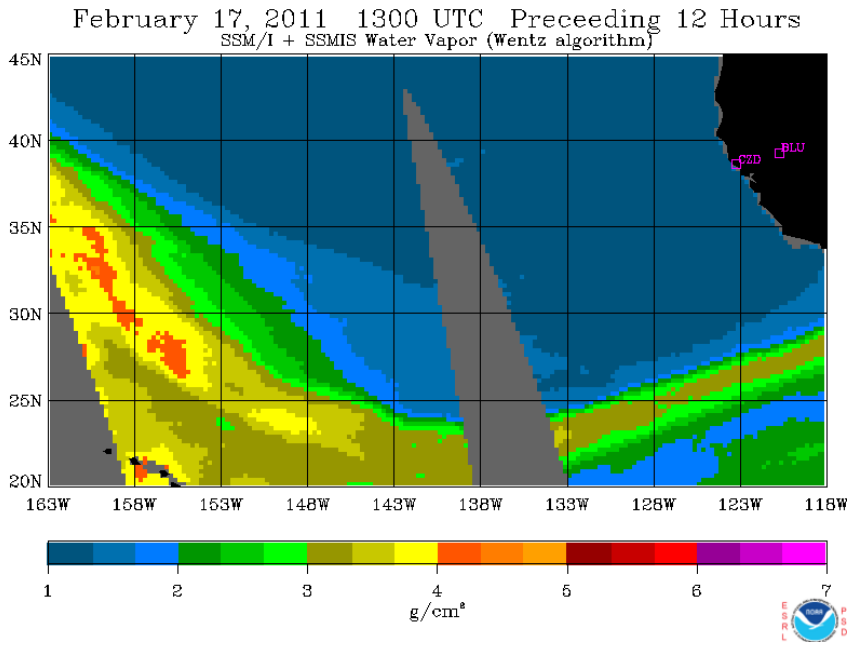


SSM/I Satellite IWV Evolution







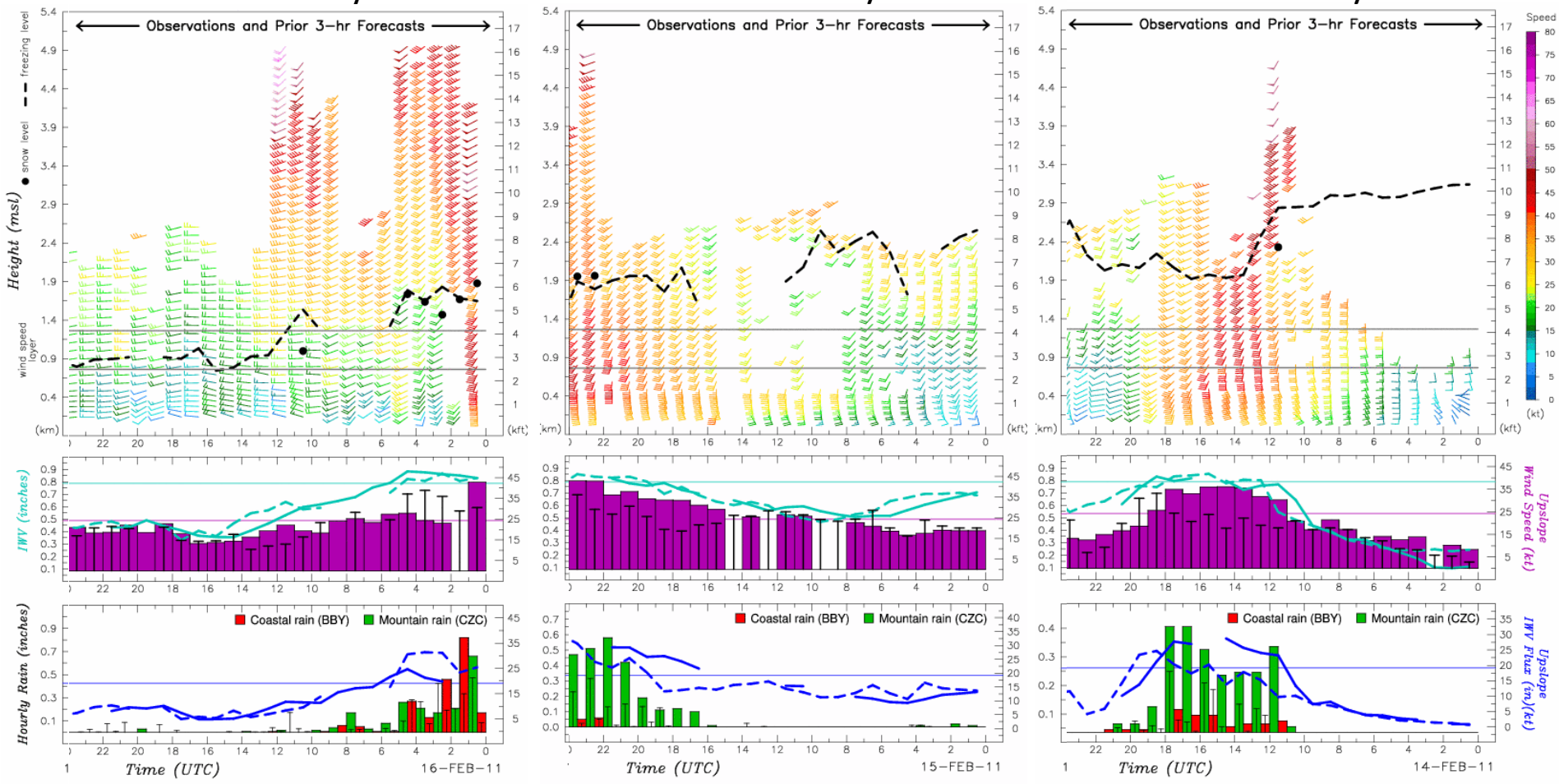


Winds and Water Vapor Flux @ Bodega Bay

ESRL Physical Sciences Division

Coastal Atmospheric River Monitoring and Early Warning System

Model forecast provided by the ESRL Global Systems Division



Bodega Bay,CA (BBY)
38.32 N, 123.07 W, 12 m

Cazadero,CA (CZC)
38.61 N, 123.22 W, 475 m

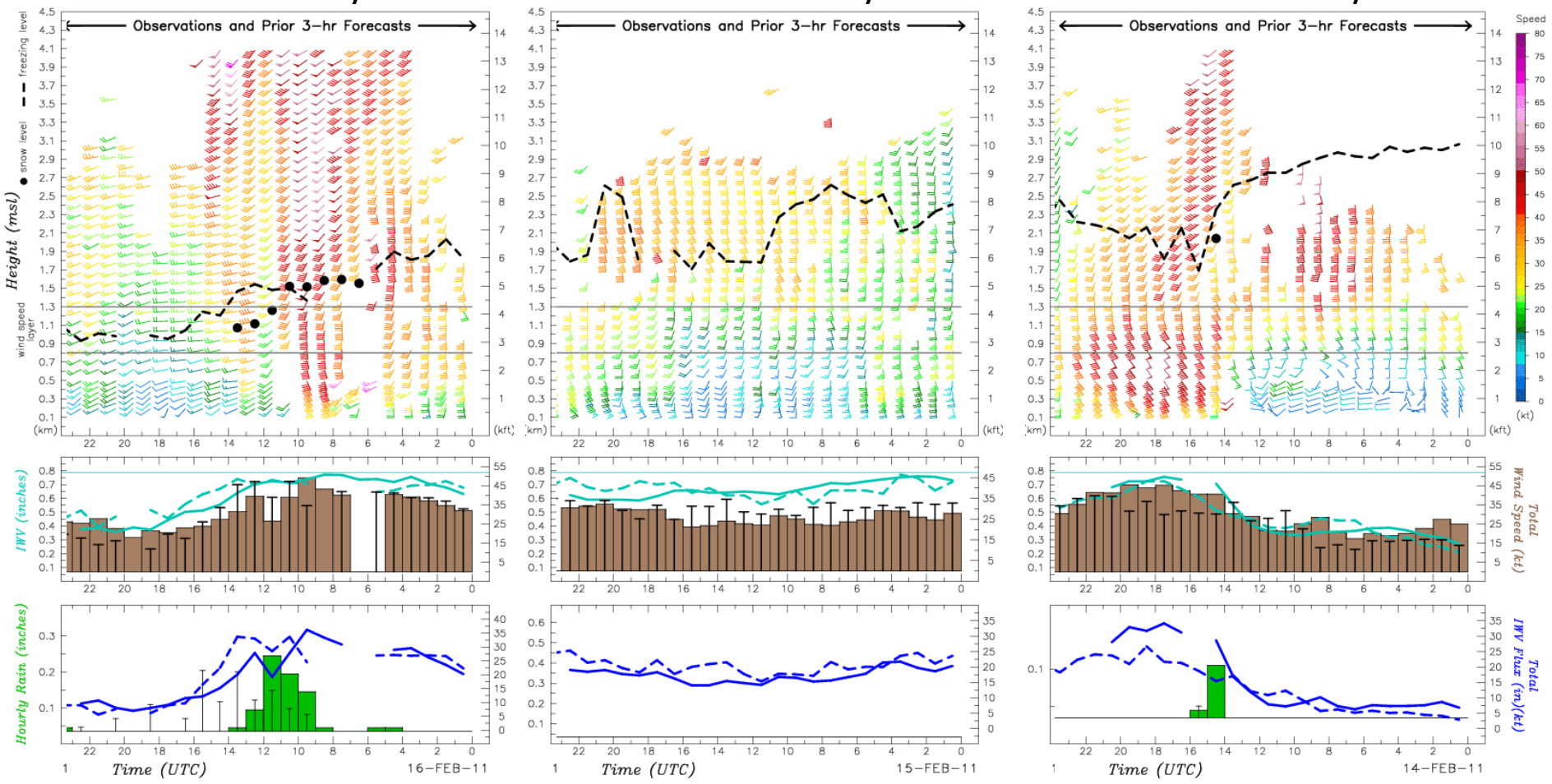
Upslope Wind Direction = 230°

Winds and Water Vapor Flux @ Sloughhouse

ESRL Physical Sciences Division

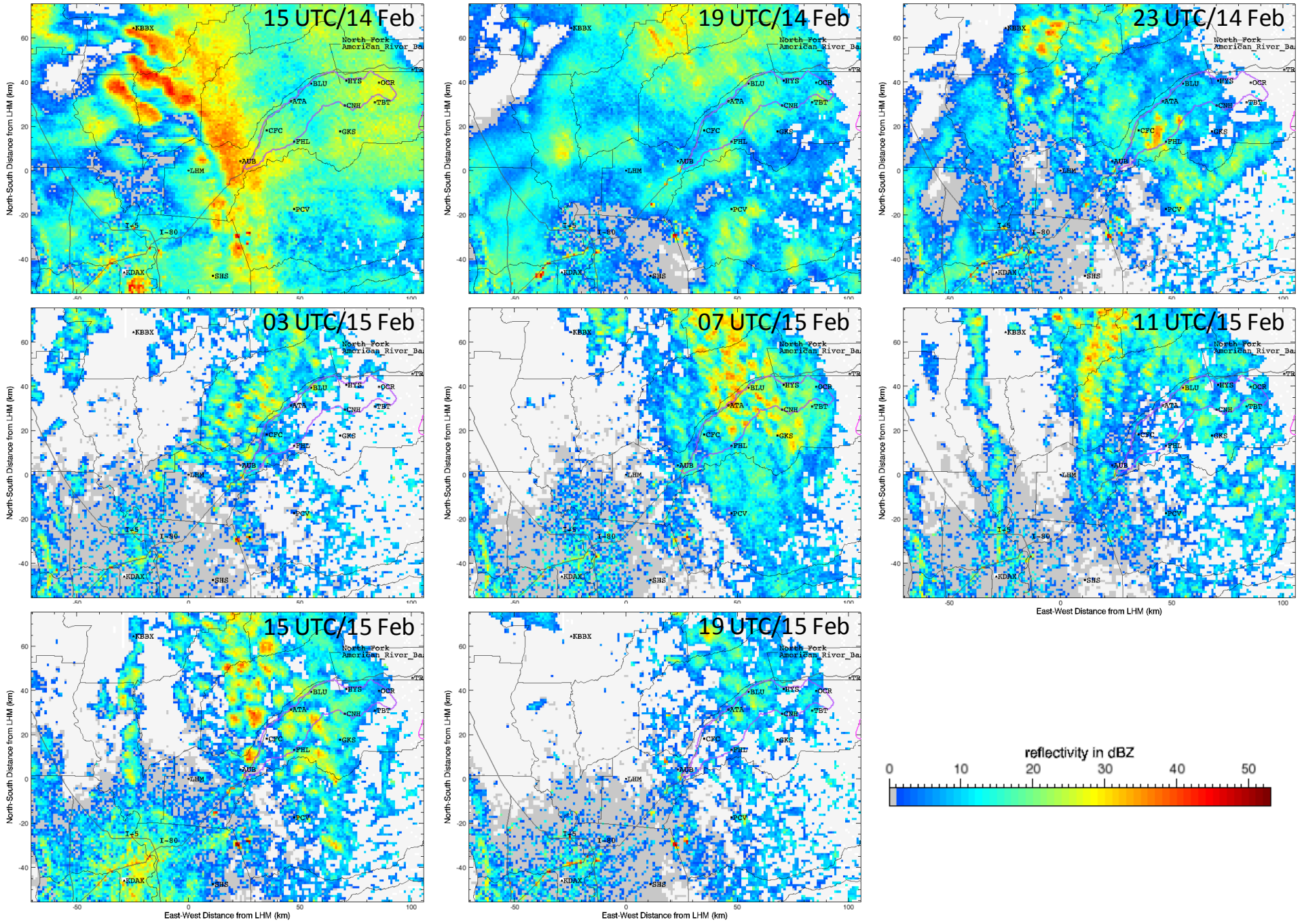
Coastal Atmospheric River Monitoring and Early Warning System

Model forecast provided by the ESRL Global Systems Division

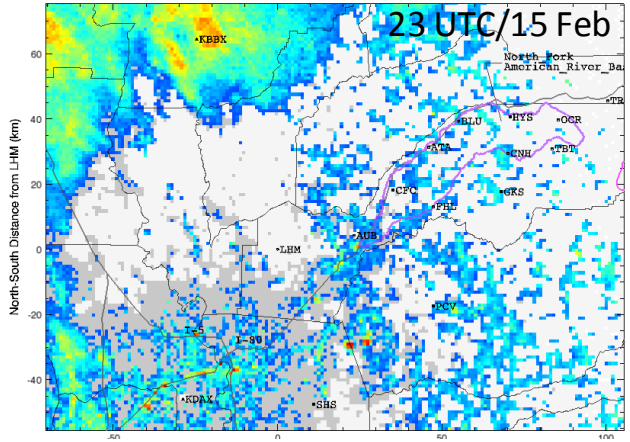


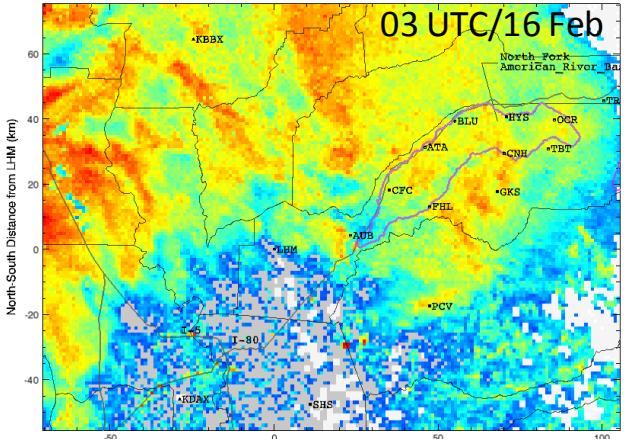
Sloughhouse,CA (SHS)
38.50 N, 121.21 W, 50 m

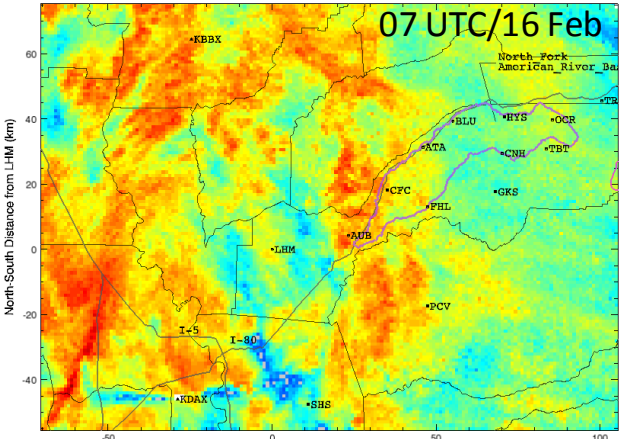
KDAX Radar Reflectivity Evolution

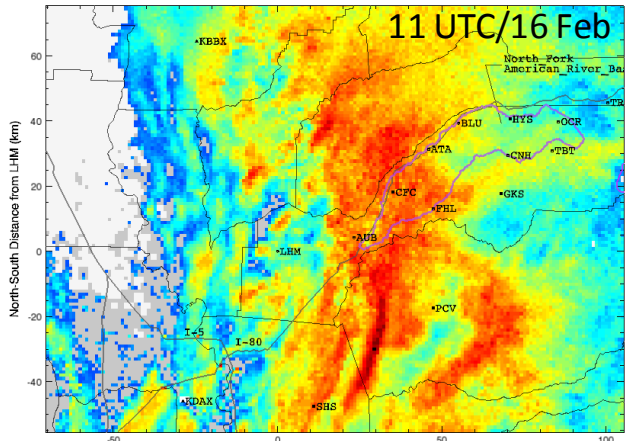


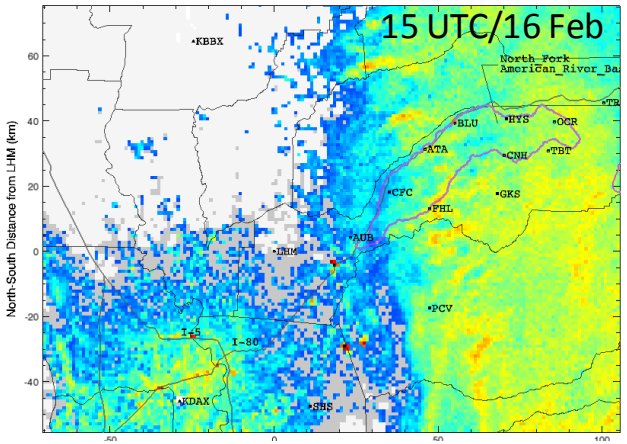
KDAX Radar Reflectivity Evolution

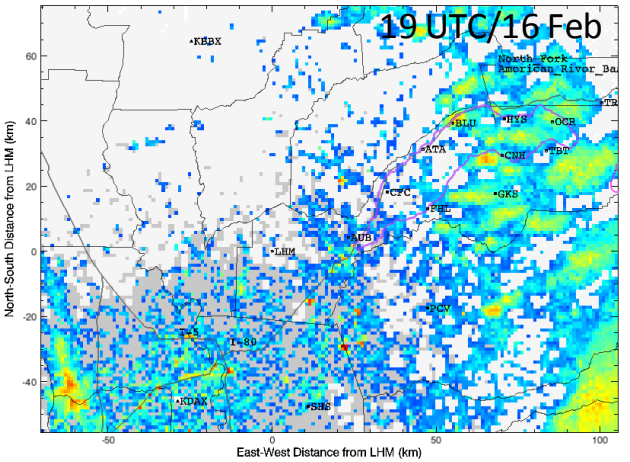


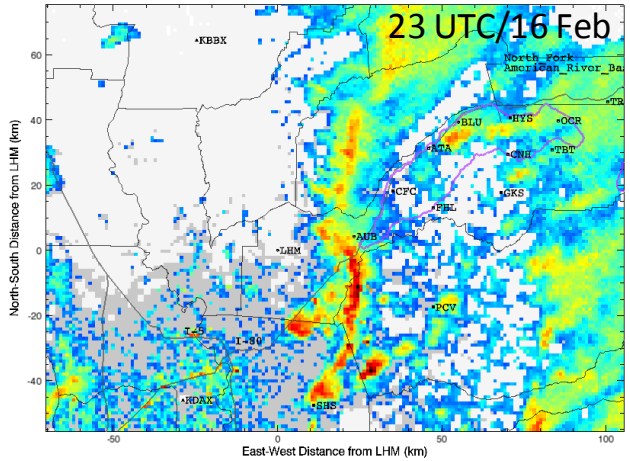


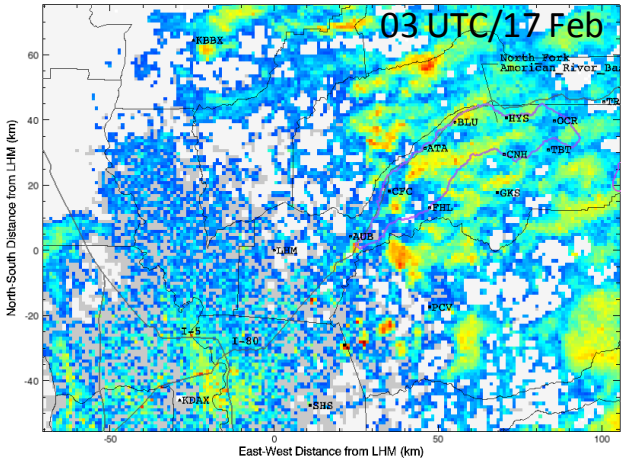


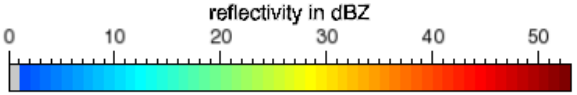










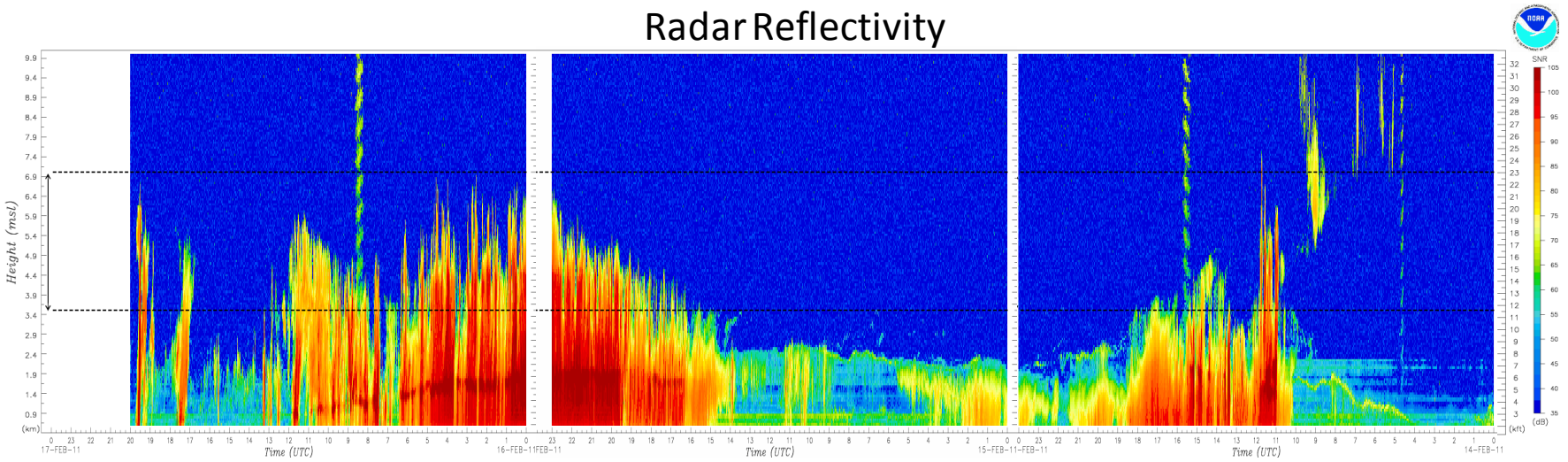


Vertical Precipitation Structure @ Cazadero

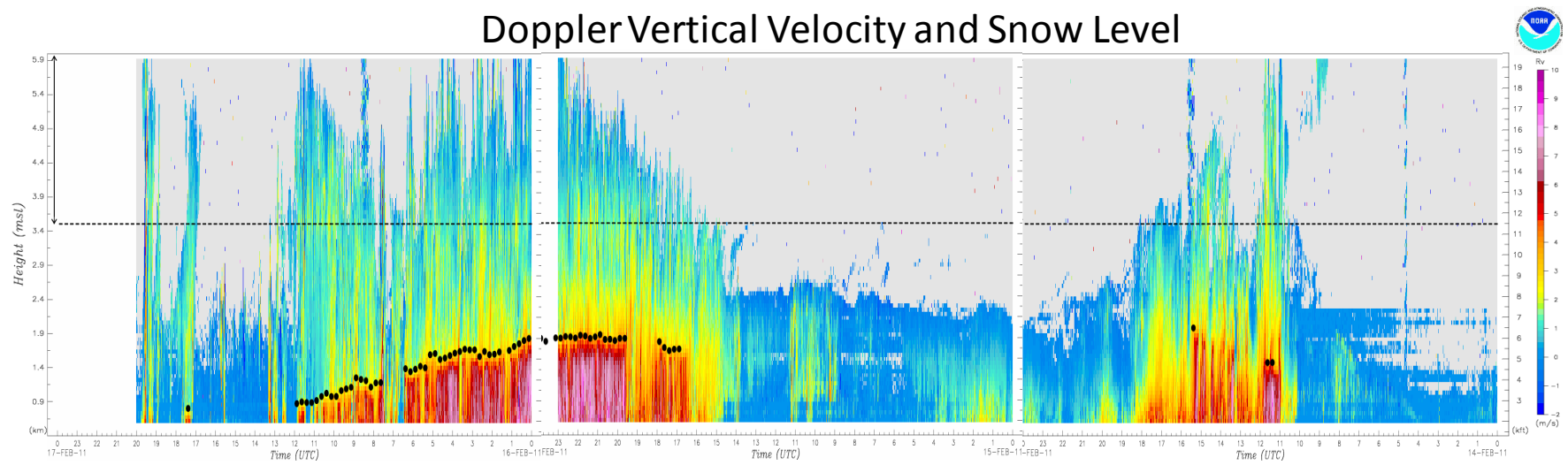
ESRL Physical Sciences Division
Precipitation Profiling Radar

16 February | 15 February | 14 February

Radar Reflectivity



Doppler Vertical Velocity and Snow Level



Cazadero,CA (CZC)
38.61 N, 123.22 W, 475 m

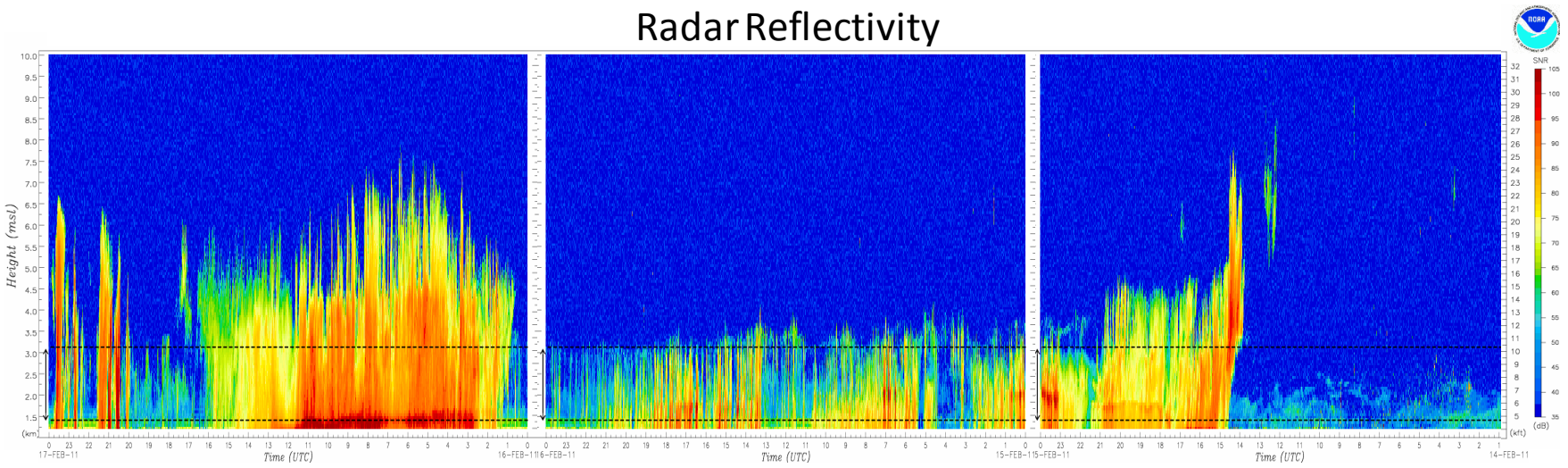
– – – KMUX NEXRAD 0.5 degree beam
● Snow Level

Vertical Precipitation Structure @ Sugar Pine

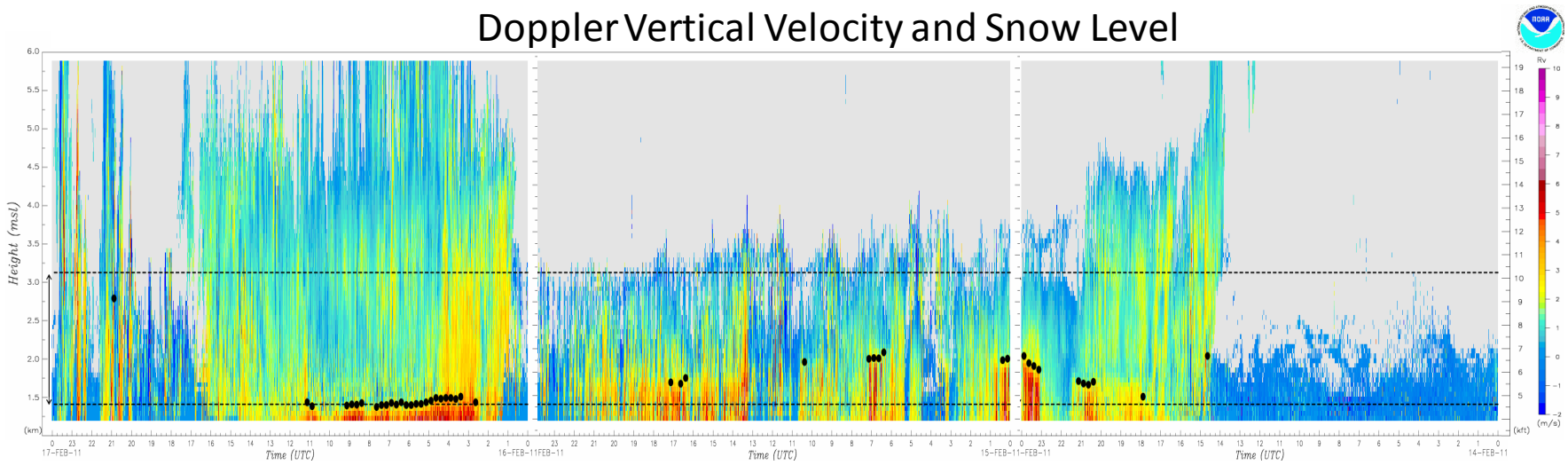
ESRL Physical Sciences Division
Precipitation Profiling Radar

16 February | 15 February | 14 February

Radar Reflectivity



Doppler Vertical Velocity and Snow Level



Sugar Pine,CA (SPD)
39.13 N, 120.80 W, 1066 m

– – – KDAX NEXRAD 0.9 degree beam
● Snow Level

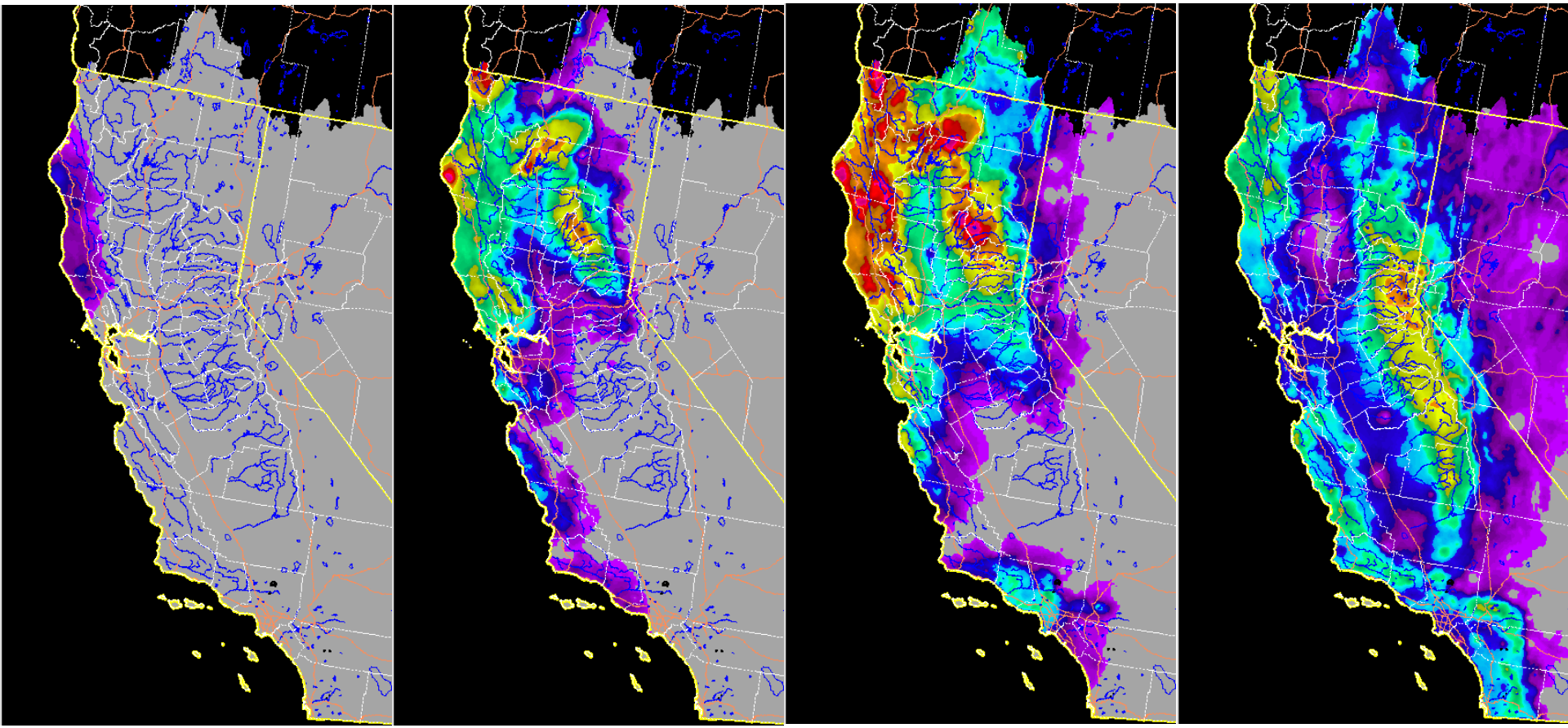
CNRFC Precipitation Gauge + Mtn. Mapper QPE

24 h ending
12 UTC 14 Feb

24 h ending
12 UTC 15 Feb

24 h ending
12 UTC 16 Feb

24 h ending
12 UTC 17 Feb



HMT + CDEC Precipitation Gauge Totals

(00 UTC 14 Feb 2011 to 00 UTC 17 Feb 2011)